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An empirical analysis of exchange rate dynamics and pass-through effects on domestic prices in Ghana

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Introduction

Since the liberalisation of the foreign exchange market in the mid-1980s (as a component of the broad structural adjustment and economic reforms programmes), the rate at which a unit of Ghana's currency (the cedi) exchanges for the US dollar and the currencies of her major trading partners has seen substantial swings. On the average, the cedi has depreciated against the US dollar since the adoption of managed floating exchange rate regime in 1986. For instance, during the first quarter of 1986, about 0.01 Cedis could exchange for a dollar; however, by the end of April 2015, the rate had risen to 3.84, representing a depreciation of 98.7% over the period. The objective of this paper is to examine real exchange rate dynamics in Ghana and its implications for domestic price stability. In particular we identify the sources of exchange rate movements and estimate the degree of exchange rate pass-through effect on consumer price inflation.

A study of exchange rate dynamics and their relationships with economic fundamentals in Ghana

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is motivated by the following reasons.

1. The real exchange rate plays a key role in the international transmission mechanism and therefore changes in its dynamic behaviour have important consequences for a small open economy like Ghana.
2. Changes in the real exchange rate affects foreign currency denominated assets and liabilities, with dire consequences for the stability of the financial system. For instance, with the government of Ghana issue of international (Euro) bonds, changes in real exchange dynamics have implications for debt servicing and eventual payment of the principal on maturity.
3. Changes in real exchange rate dynamics have repercussions on domestic price stability. The knowledge of the precise magnitude of the pass-through effect is therefore important for the conduct of monetary policy under the current inflation targeting regime.

Sources of real exchange rate dynamics

Our analyses reveal that real exchange rate dynamics in Ghana is driven by three kinds of shocks: supply, demand and nominal. Supply shocks refer to shocks that affect the supply side of the economy, such as productivity shocks. Demand shocks refer to shocks that affect aggregate demand, such as shocks to real balances, fiscal policy shocks, while nominal shocks refer to monetary disturbances such as unexpected changes in nominal money supply, and short term nominal interest rates. A positive supply shock (increased relative productivity) is found to cause the cedi to appreciate against the US dollar. This means that the chronic depreciation of the Ghanaian cedi against the US dollar is due in part to increases in relative productivity of the US economy due to its superior state of technology and ability to undertake frontier innovation. This also suggests that the rapid depreciation of the cedi emanates from adverse shock to the supply side of the economy (e.g. droughts, floods, energy crises), which reduces productivity and hence aggregate production.

Another source of real exchange rate dynamics in Ghana is real demand shocks. The study reveals that a positive real demand shock causes the Ghanaian cedi to depreciate against the US dollar. Discretionary expansionary fiscal policy that leads to high debt relative to revenue generation possibilities has a high potential of causing the cedi to depreciate against major currencies. Specifically, we show that a positive demand (one standard deviation) shock causes the real exchange rate to depreciate by 20% within the first quarter following the shock. The effect however dissipates completely at the end of the second quarter after the shock.

Last but not least, nominal shocks have been found to play a role in real exchange rate dynamics in Ghana. We find that a positive nominal shock tends to cause the cedi to depreciate against the US

dollar after the 2nd quarter, but dies-off after the 4th quarter. This implies that the depreciation effect of nominal shocks last longer than that from demand shocks, albeit the size of the effects from the nominal shocks relative the demand shocks is very small. Whereas both supply and nominal shocks tend to have a relatively long lasting effects (4 to 6 quarters) in comparison to demand shocks (1 to 2 quarters), their size of impacts is small relative to demand shocks. Thus, on the basis of the findings from this paper, real demand shocks play a significant role in quarter-to-quarter variations in the cedi-dollar exchange rates.

Further, the variance decomposition analysis revealed that demand shocks explain much of the variance of the change in real exchange rate in Ghana, followed by supply shocks. For instance, within the 6th to 12th quarter, 79% of the variance of the change in real exchange rate is attributed to demand shocks, while supply and nominal shocks account for 14% and 7% respectively. However, if we consider the decomposition of the variance of inflation, supply shocks dominates after the 6th quarter, accounting for 47% of the variance of inflation in Ghana, while 35% and 18% are attributed to nominal and demand shocks, respectively. Before the 6th quarter, nominal shocks tend to dominate in terms of percentage share of inflation variance.

Inflation dynamics and exchange rate pass-through effects

The second goal of this study is to estimate the pass-through effects from real exchange rate variations to domestic consumer price inflation. We also examine what fraction of inflation variance is attributable to real exchange rate shocks. Our analysis shows that from 8 to 12 quarters horizon, 18% of the variance in relative price(s) (inflation) is attributable to real exchange rate shocks. The results further indicate that a relative price shock explains more than a third of the inflation variance, suggesting significant inertia in the price process in Ghana. The pass-through elasticity (PT) is calculated from the impulse responses, by dividing the cumulative impulse response from inflation by the initial exchange rate shock. The calculated PT elasticity value varies significantly from the 1st quarter (0.15%) to the 12 quarter (0.68%). This result suggests that exchange rate pass-through effect is relatively large but still less than unitary, implying an incomplete pass-through effect of changes in exchange rate to prices in Ghana. This reflects less imported price sickness in the Ghanaian economy.

Policy implications

The following policy lessons are derived from the findings reported in this paper. First, demand shocks depreciate the real exchange rate implying that relying on fiscal policy including increasing government spending, such as deficit spending that is not financed via taxes (expansionary fiscal policy) tend to raise interest rates, especially if the spending is supported by domestic borrowing. This is supposed to make domestic assets attractive if the debt will be service through taxing future

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growth in the economy which has the effect of reducing current inflation as a consequence of lower future inflation expectation. However if they believe is that the debt will be paid for via seignorage (either as a result of past experience or the spending is not generating the needed growth to support the repayment from taxes), future inflation expectation will be high and will increase current inflation level, making domestic assets unattractive in the process and consequently increase demand for foreign asset that will cause the domestic currency to depreciate. In this regard, a switch from the current discretionary fiscal policy to rules based fiscal policy could have substantial effect on exchange rate and price stability in Ghana.

Additionally, whether positive demand shocks such as an increase in deficit spending will depreciate the real exchange rate depend crucially on the size of the deficit created by the fiscal policy, the future trend of the debt to the gross national product (GNP) of the country and the type and nature of the spending (spending on consumption or investment spending). If the size of the debt is large and a greater part of it goes into recurrent expenditure, inflation expectation is likely to be high. This high future inflation expectation will feed into current inflation and create a situation where domestic assets will be unattractive relative to foreign assets and cause the domestic currency to depreciate. In the case of Ghana, given the high debt to GNP ratio, deficit spending, especially domestic borrowing is most likely to be inflationary. This will increase the possibility for real interest rates to be higher than the growth of the economy, which will create depreciating pressure on the country's currency. Even if the authorities rely on foreign reserves to finance the debt (a policy tool to increase the value of a country's currency), its effect on currency appreciation is usually not sustainable and in the case of Ghana, given the size of the debt, it will only have a very short- at best stabilisng effect on the real exchange rate.

Ghana's expansionary fiscal policy over the years have resulted in government debt levels that cannot easily be supported with further debt spending without creating more instability in the macroeconomic environment of the country. Further expansionary fiscal policy will likely generate more instability as it will likely crowd-out more private investors from the capital market via high interest rates that such a policy will generate. However if the debt is spent efficiently on investment projects, it will help in reducing the instability in the medium term via increases in output and employment that will eventually support government revenue generation potentials to service some of the debt.

The second key finding is that nominal socks such as expansionary monetary policy through increase in money supply depreciate local currency. The implication is that if rather contractionary monetary policy such as a decrease in money supply will have a stabilising effect on the exchange rate as it decreases the inflationary pressure in the country and therefore reduces inflation premium on asset returns. This is likely to make domestic assets attractive and reduce the exchange rate requirement in purchasing foreign assets in the asset portfolio. However, a policy tool based entirely on directly controlling interest rate in order to stabilise prices will not help in achieving

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the intended objective as our finding provide evidence in support of a positive reaction of price to positive interest rate shocks (a price puzzle which tend to last for 6 quarters). A possible reason for this might be that, the commercial banks and other financial institutions do not react directly to the central bank's interest rate policy indicating the existence of a weak link between the interest rate set by the central bank and the lending and borrowing rates charge by commercial and other financial institutions. The indication from this is that a monetary policy tool that directly controls money supply is likely to be more effective in controlling inflation than a policy that directly controls interest rate, given the weak transmission mechanism between policy rate and inflation.

Finally, the results indicate an appreciating effect of supply shocks on exchange rate in Ghana. This therefore means that, expanding the real sector of the economy such as increasing productivity and output level of the various sectors of the economy will have positive implications on the forex outlook of the economy. However supply side management will have to be well-planned out, since this will depend on the level of both private and public investment and whether these investments are into the most productive sectors to generate the needed growth in output and employment to stabilise the macroeconomic fundamentals. Narrowing the technological gap between the country and its major trading partners (using United-States as proxy) through investment in R & D activities will increase factor productivity in the economy and thus strengthen the macroeconomic fundamentals necessary for exchange rate stabilisation.

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